OPERATIONS RESEARCH I

1	Course Title:	OPERATIONS RESEARCH I	
2	Course Code:	END3033	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	3	
6	Semester:	5	
7	ECTS Credits Allocated:	5.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	1	
11	Prerequisites:	Introduction to Mathematical Programming	
12	Language:	English	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç. Dr. Fatih ÇAVDUR	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	e-posta: fatihcavdur@uludag.edu.tr, Telefon: + 90 (224) 294 20 77 Adress: Uludağ Üniversitesi, Mühendislik-Mimarlık Fakültesi, Endüstri Mühendisliği Bölümü, Görükle Kampüsü, 16059 Nilüfer, Bursa	
17	Website:		
18	Objective of the Course:	Learning operations research techniques, and finding the best solution using the building-up analytical thinking approach.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Being able to solve linear programming problems using the simplex / atrificial starting solution / two phase simplex methods.
		2	Having knowledge about special cases of the simplex algorithm, and being able to interpret the solutions and results.
		3	Being able to perform sensitivity analysis on the solutions of linear programming models.
		4	Being able to find the dual of a problem, and to interpret the economic meaning of the solution. Being able to use dual simplex.
		5	Being able to model and solve integer programming problems.
		6	Being able to model and solve goal programming problems.
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21	Course Content:		
	Course Content:		

Week	Theoretical	Practice
1	Introduction Solution of Linear Programming Problems: Simplex Method -Standard and canonical forms -Introduction to simplex algorithm	Using LINDO for modeling linear programming problems.
2	Solving linear programming problems using simplex algorithm.	Using LINDO for the solution of linear programming problems, and interpreting results.
3	Artifical Starting Solution (Big M Method) Yapay Başlangıç Yöntemi (Büyük M Yöntemi)	Solving MS Excel Solver for modeling and solving linear programming problems, interpreting results.
4	Two-Phase Simplex Method	Solving various linear programming problems and interpreting results.
5	Special Cases of Simplex Algorithm -Degeneracy -Infeasibility -Unbounded Solution Simplex algorithm for unbounded variables	Analyzing special cases of simplex algorithms with examples.
6	Sensitivity Analysis	Sensitivity analysis practices.
7	Sensitivity Analysis -Objective function coefficient changes -Right hand side changes	Sensitivity analysis practices.
8	Sensitivity Analysis	Sensitivity analysis practices.
9	Duality Primal / Dual Problems / Variables	Examples about primal/dual transformations / solutions.
10	Dual simplex algorithm Economic interpretation of the dual solutions-shadow prices-reduced costs	Economic interpretation of the dual solution
11	Integer Programming Analyzing various integer programming problems	Modeling, solving and interpreting results of integer programming problems using MPL
12	Cutting plane algorithm Goal Programming	Modeling, solving and interpreting results of goal programming problems using MPL.
13	Analyzing various goal programming problems	
14	Solving goal programming problems -Preemptive goal programming -Non-preemptive goal programming	Analyzing various goal programming problems.
22	Textbooks, References and/or Other Materials:	1. Winston, W.L., Operations Research: Applications and Algorithms, 4th ed., Brooks/Cole-Thomson Learning, 2004. 2. Hillier, F.S.; Lieberman, G.J., Introduction to Operations Research, 9th ed., McGraw Hill, Boston, 2005.
23	Assesment	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	14	1.00	14.00
Self study and preperation	14	5.00	70.00
Homeworks	1	5.00	5.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	7.00	7.00
Others	1	5.00	5.00
Final Exams	1	7.00	7.00
Total Work Load			157.00
Total work load / 30 hr			5.00
ECTS Credit of the Course			5.00

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	30.00
Quiz	0	0.00
Home work-project	3	20.00
Final Exam	1	50.00
Total	5	100.00
Contribution of Term (Year) Learning Activities to Success Grade		50.00
Contribution of Final Exam to Success Grade		50.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		

24	ECTS / WORK LOAD TABLE

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	5	5	3	3	1	1	1	1	1	1	1	1	1	1	1	0
ÖK2	5	5	3	3	1	1	1	1	1	1	1	1	1	1	1	0
ÖK3	5	5	3	4	1	1	1	1	1	1	1	1	1	1	1	0
ÖK4	5	5	3	4	1	1	1	1	1	1	1	1	1	1	1	0
ÖK5	5	5	3	4	1	1	1	1	1	1	1	1	1	1	1	0
ÖK6	5	5	3	4	1	1	1	1	1	1	1	1	1	1	1	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	1 very low		2 low		3 Medium		4 High		5 Very High							